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Subjective Score for Oral Mouth Dryness (SSOD)

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ABSTRACT

Background: Due to the obvious adverse effect of a reduced flow rate of Salivary on a person's quality of life and oral health, it has been proposed that salivary function testing be included in routine dental examinations. To design a score that semi-quantitatively assesses the degree to which patients are affected by their dry mouth condition and to determine whether this SSOD correlates with different measures of dryness. *Methods:* A cross-sectional study was conducted from March 2021 - January 2022. Two questionnaires were designed: (a) SSOD2 consisted of 5 questions about the severity of dry-mouth and any psychological effect on the patient. (b) SSOD1 contained score from 0-10 on assessment of the patient after clarification. The surveys were issued via interview to 90 control subjects and 90 patients who had historically been examined and shown by sialometry. *Results:* One-way ANOVAs demonstrated that the two SSOD indices showed a highly significant difference between dry mouth patients and controls (mean value ± SEM for SSOD1 in patients was 6 ± 0.31 and in controls was 0.3 ± 0.07) and values were high and correlated, with a coefficient of 0.88 ($p<0.001$). In patients with dry-mouth, the indices were inversely correlated with UWM flow rate of salivary and MW; (SSOD1: -0.62 correlation coefficient; SSOD2: -0.55 correlation coefficient; $p = .001$). *Conclusion:* The two SSOD indices were significantly higher in patients with low UWM flow and can be used in the assessment and monitoring of dry mouth.

Keywords: Dryness, Oral Mouth, Subjective Score.

1. INTRODUCTION

Dry mouth could be identifying with two possible manifestations. Xerostomia is a subjective experience of dry mouth that can only be measured by interviewing people directly (Ying Joanna & Thomson, 2015). Salivary gland hypo-function (SGH) consequences in Salivary production flow-rate which, is lower than normal; it can consequently be determined by vitalometry (Sarideechaigul et al., 2021). SGH is defined as a condition in which the salivary flow rate falls below a certain clinical threshold. Xerostomia is a symptom, and SGH is a sign, according to these criteria (A doctor observes a sign; a symptom can only be discovered by questioning the patient) (Villa et al., 2014). It is not necessary that every individual agonize from dry-mouth will have Salivary gland hypofunction (López-Pintor et al., 2022). Among the general public the prevalence of dry mouth can range between 10-20%. It varies widely due to methodological and population differences used in

various studies. In the elderly (60+ years) population the mean prevalence from published studies is 23% ± 3 (Abdullah, 2015; Nayak et al., 2004)

Factors associated with the increased occurrence of dry mouth are age, gender, and number of prescribed medications (Han et al., 2015; Johansson et al., 2020). There are other related factors to the prevalence of dry mouth such as dental health and chewing capacity (Cheng et al., 2019), heavy smoking and alcohol drinking can cause transit oral dryness (Berkey & Scannapieco, 2013; Phantumvanit et al., 2018). The subjective perception of dry mouth (xerostomia) is associated with general health problems, social and psychological circumstance, income and hospitalization and institutionalization (Damaskinos, 2020; Marchini et al., 2019).

The majority of xerostomia studies are based on questions that inquire whether and how consistently the people being screened suffer from dry mouth (Agostini et al., 2018; Nederfors et al., 1997; Stankeviciene et al., 2021). The most widely questionnaire is the xerostomia inventory (XI) by Thomson et al., (1999). But most of these studies did not investigate if the same individual who has xerostomia has salivary gland hypofunction (Wimardhani et al., 2021). A study by Nayak was based on questionnaires, asking the gold standard question "how often has your mouth felt dry in the last four weeks" (Nayak et al., 2004), other study was done by Thomson, the authors also used other similar questions to the previous studies of (Murray Thomson et al., 1999) and used Geriatric oral health assessment index (GOHAI) as previously used by Locker, to interview and screen subjects (Locker, 1993).

Although subjective complaints of oral dryness do not compare well with quantifiable salivary gland, approximately symptoms have been discovered to have predictive value but patients should be questioned in greater detail about their dryness. In general, questions, which focus on oral activities dependent on salivation, such as chewing and swallowing, are most likely to identify patients with salivary hypofunction (Thomson et al., 1999). An example of a questionnaire used by Fox Such questionnaires help to define the group requiring further evaluation for disease and conditions, such as Sjögren's syndrome and rheumatoid arthritis. Such evaluation would include measurement of salivary output, lacrimal flow, blood tests and labial biopsy to achieve the right diagnosis (Atkinson et al., 2005; Fox et al., 1987; Greenspan et al., 1974; Navazesh et al., 1992; Price & Venables, 2002). It is generally accepted that the following protocol has to be done routinely in all dry moth patients. A proper history taking, with most symptoms, it is difficult to quantify dry mouth complaints precisely and reproducibly.

A history of chief complaint of oral dryness is essential (Coulthard et al., 2013). Asking detailed questions about oral dryness symptoms and medications taken is helpful. In addition, full routine medical screening is also required. Investigators have used a variety of methods including questionnaires, Visual Analog-Scales (VAS), simple functional measures such as difficulties in swallowing certain foods, getting up at night to drink, difficulty in eating dry food, burning or itching sensation of tongue, another question, if a patient can chew and swallow ~~a~~ dry food like biscuits without water (Jager et al., 2018).

The goal of this paper is to design and conduct a questionnaire for dry mouth that semi-quantitatively assesses the degree to which patients are affected by their dry mouth condition also to determine whether this SSOD correlates with different objective measures of oral dryness.

2. MATERIALS AND METHODS

Two questionnaires for dry mouth/xerostomia were designed. The first questionnaire poses the fundamental question "on a scale of 1-10, how much is your dry mouth problem bothering you" and was named "SSOD1" because it consists of 1 item (Figure 1).

Q. On a scale of 0 to 10, how much does your dry mouth bother you ?
0 =does not bother me at all.
10 = unbearable, it bothers me all the time.

Figure 1 The first questionnaire poses the fundamental question "SSOD1"

The second questionnaire comprises of 5 questions and was called "SSOD2" (Figure 2). The questionnaire was conducted on 90 patients with dry mouth, which were previously evaluated and found to have a lower Un-stimulated Whole Mouth (UWM) salivary flow rate and a higher Clinical Score of Oral Dry-ness using sialometry as described at (Osailan et al., 2012). These patients participated in a dry mouth study, which involved a thorough investigation of the oral dryness. Each patient assessment and measurement involved salivary flow rates; unstimulated whole (UWM) and stimulated parotid (SP) and mucosal wetness as described at Osailan et al., (2010), and clinical score of oral dryness (intraoral clinical examination for certain feature of oral dryness) as described at (Osailan et al., 2012). The same questionnaire was given to 90 healthy subjects to complete as controls.

Q1. Do you have a dry mouth problem?

Q2. Does your dry mouth stop you from doing everyday activities? e.g. talking on the phone, going out.

Q3. Do you avoid doing certain activities which you would really like to do because of your dry mouth? e.g. travelling, going to the gym.

Q4. Does your dry mouth stop you from eating the food you like?

Q5. Do you feel embarrassed because of your dry mouth?

Figure 2 Second questionnaire comprises of 5 questions and was called "SSOD2"

Never = 0, occasionally =1, some of the time = 2, Most of the time = 3, All of the time = 4 Overall score out of 20 (4x5Qs).

Data collection and analyses

SSOD data was divided to different groups for the purpose of statistical analysis. SPSS version 20 was used for that.

3. RESULTS

Reponses were good, there was nighty out of a hundred subjects replied and 90 healthy volunteers were used as controls. The Comparison between the two Subjective score for oral dryness scores (SSOD1 & SSOD2) shows highly significant difference between dry mouth patients and controls. SSOD1 was 6+ 0.25 and 0.3 + 0.08 in patients and control respectively. SSOD 2 was 10+ 0.04 + 0.14 (Table 1).

Table 1 The Comparison between the two Subjective score for oral dryness scores (SSOD1 & SSOD2)

Subjective score	SSOD2	SSOD2
Patients	10 ± .47	6 ± .25
Controls	0.6 ±.14	0.3 ± .08

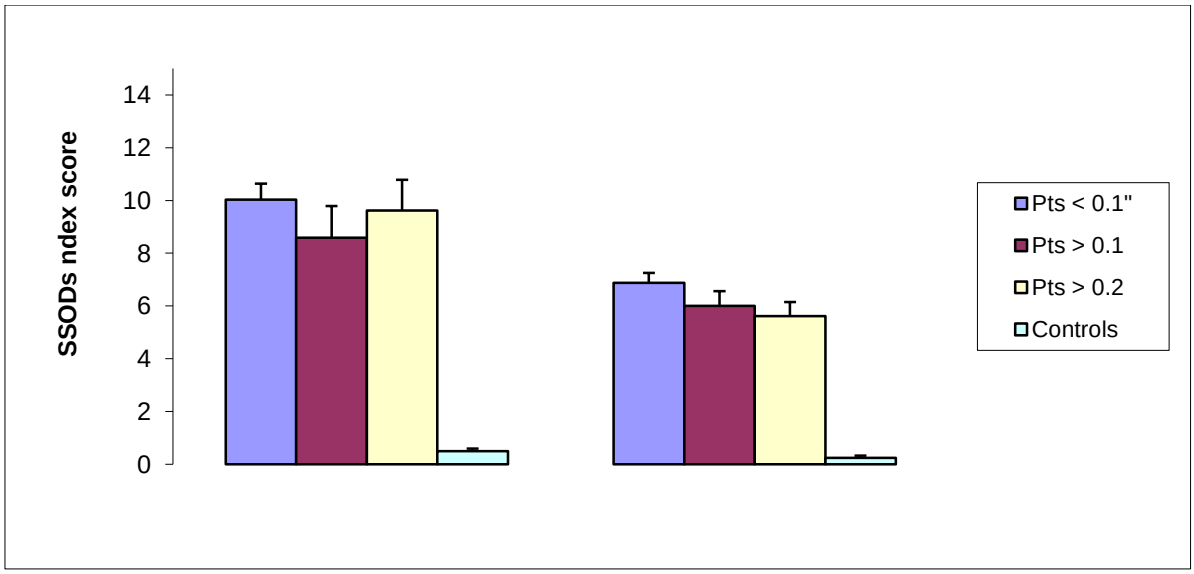

Figure 3 The three patient groups were significantly higher than the controls.

Different correlations were done between SSODs and different parameters such as age, unstimulated whole mouth salivary flow rate (UWM), clinical score of oral dryness (CODS), and mucosal wetness (MW). Firstly, correlations between the two SSDOs were highly correlated. The effect was 0.88 ($p<0.001$) with parametric –Pearson and 0.92 ($p< 0.001$) with the non-parametric- Spearman. Secondly, both scores (SSOD1 & SSOD2) showed significant correlation with age; the Pearson test was 0.48 for SSOD2 and 0.51 for

SSOD1 (p <0.001). The older the subject was, the higher the score. Thirdly, the Pearson test showed that the two SSODs were inversely correlated with UWM salivary flow rate and the clinical score. The two correlations were significant ($p < 0.01$) on dry mouth patients only. When comparing SSODs with different salivary flow rate groups and controls. The two SSODs were significant with low UWM groups (Figure 3).

Fourthly, the two SSODs were inversely correlated with the four mucosal wetness sites (table 2). The two SSODs were inversely correlated with UWM salivary flow rate and positively correlated with the CODS as described in (Osailan et al., 2012). Patients are exhibiting low flow rate will give high SSOD score, while patients with high CODS will score high in both SSODs. The two SSODs were also inversely correlated with mucosal wetness (MW) at the four MW sites as described (Osailan et al., 2011).

Table 2 SSODs & mucosal wetness

Bother index	AHP thickness (μm)	BUC thickness (μm)	AT thickness (μm)	LL thickness (μm)
SSOD2	.18	.43	.42	.26
Sig	.056	.0001	.0001	.009
SSOD1	.17	.35	.36	.28
Sig	.06	.0001	.0001	.006

AHP= Anterior Hard Palate, BUC: Buccal, AT: Anterior Tongue, LL: Lower Lip. Statistically significant $P < 0.05$

4. DISCUSSION

The findings of this study demonstrate that the two SSODs exhibit high significant difference between dry mouth patients and controls. It is a good parameter for the diagnosis of oral dryness. Other studies using a questionnaire-based format compare it with age and salivary flow rates (Thomson, 2015). Also, both SSODs are affected by many factors such age, taking multiple medication or polypharmacy (Nederfors et al., 1997; Percival et al., 1994; Pujol et al., 1998; Thomson, 2015).

Furthermore, this study found both SSODs were correlated with all three objective measures separately. This could result in when running SSODs questionnaires for dry mouth sufferers can be a good alert for clinicians to do further investigations and early diagnosis of certain systemic diseases where salivary glands are affected such Sjögren's syndrome and systemic lupus erythematous, and others conditions.

There appears to be a direct correlation between the semi-quantitative assessment by patients of their symptoms and the semi quantitative clinical assessment of signs. This powerfully recommends that both techniques of evaluation can be suitable in the assessment of the dry-mouth patients.

5. CONCLUSIONS

The two SSODs were highly correlated to each other. The two SSODs have a highly significant difference between dry mouth patients and controls. The correlation with age was significant for both indexes, i.e. the older the subject the higher the score. Females scored higher than males in both indices, but it was not significant. Correlation to UWM and clinical score was significant in patients but not in controls. SSOD1 can make distinction between patients according to their diagnosis. The two SSODs were significant in patients with low UWM flow.

Ethical approval

The research proposal was approved by the Ethical Committee of Human Research at the School of Dentistry-KAU, in Jeddah, Saudi Arabia with Ethical approval number (012-0177).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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